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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/511,807

Applicant(s)

BREEBAART ET AL.

Examiner

DEVONA E. FAULK

Art Unit

2614

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9,10,12-14,16 and 17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7,9,10,12-14,16 and 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/30/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 3/26/07 have been fully considered but they are not persuasive. The applicant's have amended the claims with "...wherein the at least two input audio channels are time/frequency sliced such that they can be analyzed as a function of time..". The applicant only asserts that prior art Baumgarte and Veldhuis fails to teach the limitation without any explanation as to why that is the case. The examiner disagrees with the applicant's assertion. The examiner asserts that Baumgarte teaches that the input channels are time/frequency sliced so that they can be analyzed as a function of time. Baumgarte teaches that encoder 1201 is implemented based on transmitter 1000 which applies a TF transform to each input channel to convert the signals from the time domain to the frequency domain, frequency is a function of time (See ¶0073,0082). The examiner asserts that this reads on the newly recited claim language.
2. In the applicant's previous response filed on 5/22/08, the applicant amended claim 12 to overcome a 101 rejection set forth in the office action mailed on 2/22/08. The examiner determined that the amendment overcame the 101 rejection but failed to put on record why the 101 rejection of claim 12 was overcome. So, the examiner is putting on the record in this office action. Claim 12 was amended to recite " A computer readable medium including code for a method of coding a multi-channel audio signal, said medium comprising: ...". Regarding claim 12, the examiner notes that the applicant's response (filed 5/22/08) stated " Amended claim 12 recites data being stored

on a computer-readable storage medium, which data imparts function to a computing device. “.

Paragraphs 0046 and 0062 of the published patent application provide support for this language. **[0046]** It is noted that the features of the method described above and in the following may be implemented in software and carried out in a data processing system or other processing means caused by the execution of computer-executable instructions. The instructions may be program code means loaded in a memory, such as a RAM, from a storage medium or from another computer via a computer network. Alternatively, the described features may be implemented by hardwired circuitry instead of software or in combination with software. **[0062]** The invention further relates to a storage medium having stored thereon such an encoded signal. Here, the term storage medium comprises but is not limited to a magnetic tape, an optical disc a digital video disk (DVD), a compact disc (CD or CD-ROM), a mini-disc, a hard disk, a floppy disk, a ferro-electric memory, an electrically erasable programmable read only memory (EEPROM), a flash memory, an EPROM, a read only memory (ROM), a static random access memory (SRAM), a dynamic random access memory (DRAM), a synchronous dynamic random access memory (SDRAM), a ferromagnetic memory, optical storage, charge coupled devices, smart cards, a PCMCIA card, etc.

The examiner determined therefore that there was no 101 issue regarding claim 12.

3. Claims 8,11 and 15 are cancelled.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-7,9-10,13-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Baumgarte et al. (US 2003/0035553).

6. Regarding claim 1, Baumgarte discloses a method of coding a multi-channel audio signal, the method comprising:

generating a monaural signal comprising a combination of at least two input audio channels (mono audio signal generated by PCSC encoder 1201, Figure 12; page 7, ¶ 0081) wherein the at least two input audio channels are time/frequency sliced such that they can be analyzed as a function of time (encoder 1201 is implemented based on transmitter 1000 which applies a TF transform to each input channel to convert the signals from the time domain to the frequency domain, frequency is a function of time; ¶0073,0082)

determining a set of spatial parameters indicative of spatial properties of the at least two input audio channels (PCSC encoder generates spatial cues based on audio signals input to PCSC encoder and is implemented based on transmitter 1000 of Figure 10, Figure 12, ¶ 0081-0082 and ¶ 0074), the set of spatial parameters including a

parameter representing a measure of similarity of waveforms of the at least two input audio channels (in transmitter 1000 each pair of frequency bands for left and right audio signals are compared to generate one more spatial cues (e.g. an ILD value, an ITD value and/or an HRTF (§ 0074); for each frequency band, a cross-correlation between the converted left and right audio signals is estimated)

and generating an encoded signal comprising the monaural signal and the set of spatial parameters (modulation module 1204 embeds the sets of auditory scene parameters generated by the PCSC encoder into the mono signal to generate a PCSC 0073signal that is transmitted to the PCSC receiver, Figure 12; page 7, § 0082).

Claim 2 is dependent upon claim 1. Regarding claim 2, Baumgarte discloses wherein the step of determining a set of spatial parameters indicative of spatial properties comprises determining a set of spatial properties as a function of time and frequency (Baumgarte , page 6, § 0074 teaches that the location in time of the maximum of the cross-correlation corresponds to the ITD and the ILD is obtained by computing the level difference of the power spectral values of the left and right signals).

Claim 3 is dependent upon claim 2. Regarding claim 3, Baumgarte discloses dividing each of the at least two input audio channels into corresponding pluralities of frequency bands and for each of the plurality of frequency bands determining the set of spatial parameters indicative of spatial properties of the at least two input audio channels within the corresponding frequency band (§ 0073-0074).

Claim 4 is dependent upon claim 1. Regarding claim 4, Baumgarte discloses wherein the set of spatial parameters includes at least one localization cue (page 6, ¶ 0074 teaches of spatial parameters that include an ILD and an ITD).

Claim 5 is dependent upon claim 4. Regarding claim 5, Baumgarte discloses wherein the set of spatial parameters includes at least tow localization cues comprising an interchannel level difference and a selected one of an interchannel time difference and an interchannel phase difference (See Baumgarte page 6, ¶ 0074 as applied to claim 4 above).

Claim 6 is dependent upon claim 4. Regarding claim 6, Baumgarte discloses wherein the measure of similarity comprises information that cannot be accounted for by the localization cues (page 6, ¶ 0074 teaches that the maximum value of the cross-correlation is used, the maximum value reads on information that cannot be accounted for the localization cues).

Claim 7 is dependent upon claim 1. Regarding claim 7, Baumgarte discloses wherein the measure of similarity corresponds to a value of a cross-correlation function at a maximum of said cross-correlation function (page 6, , ¶ 0074 that the maximum of the cross-correlation is used).

Regarding claim 9, Baumgarte discloses a method of coding a multi-channel audio signal, the method comprising:

means for generating a monaural signal comprising a combination of at least two input audio channels (mono audio signal generated by PCSC encoder 1201, Figure 12;

page 7, ¶ 0081) wherein the at least two input audio channels are time/frequency sliced such that they can be analyzed as a function of time (encoder 1201 is implemented based on transmitter 1000 which applies a TF transform to each input channel to convert the signals from the time domain to the frequency domain, frequency is a function of time; ¶0073,0082)

means for determining a set of spatial parameters indicative of spatial properties of the at least two input audio channels , the set of spatial parameters including a parameter representing a measure of similarity of waveforms of the at least tow input audio channels (PCSC encoder 1201 generates spatial cues based on audio signals input to PCSC encoder and is implemented based on transmitter 1000 of Figure 10, Figure 12, ¶ 0081-0082 and ¶ 0074; in transmitter 1000 each pair of frequency bands for left and right audio signals are compared to generate one more spatial cues (e.g. an ILD value, an ITD value and/or an HRTF (¶ 074); for each frequency band, a cross-correlation between the converted left and right audio signals is estimated),

and means for generating an encoded signal comprising the monaural signal and the set of spatial parameters (modulation module 1204 embeds the sets of auditory scene parameters generated by the PCSC encoder into the mono signal to generate a PCSC signal that is transmitted to the PCSC receiver, Figure 12; page 7, ¶ 0082) .

Regarding claim 10, Baumgarte as applied above to claim 9 discloses an apparatus for supplying an audio signal, the apparatus comprising::

an input for receiving an audio signal (inputs to PCSC encoder 1204),

an encoder as claimed in claim 9 for encoding the audio signal to obtain an encoded signal (See Baumgarte as applied to claim 9 above),

and an output for supplying the encoded audio signal (output of modulation module 1204 is the encoded signal, Figure 12; page 7, ¶ 0082).

Regarding claim 13, Baumgarte discloses a method of decoding an encoded multi-channel audio signal, the method comprising:

obtaining a monaural signal from the encoded audio signal, the monaural signal comprising a combination of at least two channels (1206 module of the receiver obtains the mono audio signal from the encoded audio signal, Figure 12; ¶ 0084; Figure 12; page 7, ¶ 0081),

obtaining a set of spatial parameters from the encoded audio signal, the set of spatial parameters including a parameter representing a measure of similarity of waveforms of the at least two audio channels (PCSC decoder 1209, Figure 12, ¶ 0084, ¶ 0074) wherein the at least two input audio channels are time/frequency sliced such that they can be analyzed as a function of time (encoder 1201 is implemented based on transmitter 1000 which applies a TF transform to each input channel to convert the signals from the time domain to the frequency domain, frequency is a function of time; ¶0073,0082),

and generating a multi-channel output signal from the monaural signal and the spatial parameters (PCSC decoder 1209 generates a multi-channel output ; Figure 12, ¶ 0084), the set of spatial parameters including a parameter representing a measure

of similarity of waveforms of the multi-channel output signal, wherein the measure of similarity corresponds to a value of a cross-correlation function at a maximum of said cross-correlation function of the multi-channel output signal (in transmitter 1000 each pair of frequency bands for left and right audio signals are compared to generate one more spatial cues (e.g. an ILD value, an ITD value and/or an HRTF (¶ 074); for each frequency band, a cross-correlation between the converted left and right audio signals is estimated; page 6, , ¶ 0074 that the maximum of the cross-correlation is used).

Regarding claim 14, Baumgarte discloses a decoder for decoding an encoded multi-channel audio signal, the decoder comprising:

means for obtaining a monaural signal from the encoded audio signal, the monaural signal comprising a combination of at least two channels (1206 module of the receiver obtains the monaural signal from the encoded audio signal , Figure 12; ¶ 0084),

means for obtaining a set of spatial parameters from the encoded audio signal , the set of spatial parameters including a parameter representing a measure of similarity of waveforms of the at least two audio channels(PCSC decoder 1209, Figure 12, ¶ 0084, ¶ 0074) wherein the at least two input audio channels are time/frequency sliced such that they can be analyzed as a function of time (encoder 1201 is implemented based on transmitter 1000 which applies a TF transform to each input channel to convert the signals from the time domain to the frequency domain, frequency is a function of time; ¶(0073,0082),

and means for generating a multi-channel output signal from the monaural signal and the spatial parameters (PCSC decoder 1209 generates a multi-channel output ; Figure 12, ¶ 0084), the set of spatial parameters including a parameter representing a measure of similarity of waveforms of the multi-channel output signal, wherein the measure of similarity corresponds to a value of a cross-correlation function at a maximum of said cross-correlation function of the multi-channel output signal (channels (in transmitter 1000 each pair of frequency bands for left and right audio signals are compared to generate one more spatial cues (e.g. an ILD value, an ITD value and/or an HRTF (¶ 074); for each frequency band, a cross-correlation between the converted left and right audio signals is estimated; page 6, , ¶ 0074 that the maximum of the cross-correlation is used).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgarte et al. (US 2003/0035553) in view of Veldhuis (US 5,621,855) .

Regarding claim 16 and 17, Baumgarte discloses generating an encoded signal and a set of spatial parameters. Baumgarte fails to disclose generating a set of quantized spatial parameters, each introducing a corresponding quantization error relative to the

corresponding determined spatial parameter, wherein at least one of the introduced quantization errors is controlled to depend on a value of at least one of the determined spatial parameters.

Quantization is well known in the art as taught by Veldhuis.

Veldhuis discloses generating a set of quantized spatial parameters(quantizers 36 and 37,Figure 2a), each introducing a corresponding quantization error relative to the corresponding determined spatial parameter, wherein at least one of the introduced quantization errors is controlled to depend on a value of at least one of the determined spatial parameters (Quantization error is defined as the difference between the actual analog value and quantized digital value due is called quantization error. This error is due either to rounding or truncation. It is therefore implicit that the quantization error is dependent upon a value of the spatial parameters). It would have been obvious to modify Baumgarte so that the spatial parameters are quantized for the benefit of reducing the amount of data that has to be processed.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgarte et al. (US 2003/0035553) in further view of Davis et al. (WO 99/04498).

Regarding claim 12, Baumgarte discloses most of the limitations of claim 12 (See Baumgarte as applied above to claim 1) . Baumgarte fails to disclose a storage medium having stored thereon an encoded audio signal. Davis discloses a storage medium having stored thereon an encoded signal as claimed in claim 11 (Davis discloses that an encoded audio signal is passed along path 51 for transmission or storage; page 7,

lines 30-32, Figure 1). It would have been obvious to modify Baumgarte by providing a storage medium so that the encoded audio signal can be stored so that the data can be saved.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **DEVONA E. FAULK** whose telephone number is (571)272-7515. The examiner can normally be reached on 8 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivian Chin can be reached on 571-272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devona E. Faulk/
Examiner, Art Unit 2614